

## CLAIMS:

- 1 *Sub*  
2 *PI*
1. A projection television comprising:  
2 an optical system comprising at least three image projectors  
3 (14, 16, 18) for projecting respective images of different colors  
4 onto a projection screen (22), and a holographic reflector (20)  
5 disposed in optical communication with said image projectors and  
6 said screen so that one (16) of said projectors has a first optical  
7 path in a substantially orthogonal orientation with said screen and  
8 at least two (14, 18) of said projectors have respective optical  
9 paths converging toward said first optical path in a non orthogonal  
10 orientation defining angles of incidence; and,  
11 said projection screen (22) comprising a three dimensional  
12 hologram (26) representing a three dimensional diffraction array  
13 on a substrate (24), said screen receiving images from said  
14 projectors (14, 16, 18) on a first side and displaying said images  
15 on a second side with controlled light dispersion of all said  
16 displayed images.
- 1 2. The projection television of claim 1 wherein said at least  
2 three projectors (14, 16, 18) each include a lens (15, 17, 19)  
3 adapted to focus said respective images.
- 1 3. The projection television of claim 2 wherein said lenses  
2 (15, 17, 19) comprise a polymer material.

1        4. The projection television of claim 1 wherein said image  
2 projectors (14, 16, 18) comprise exit pupils at least substantially  
3 lacking magnification and focusing properties.

1        5. The projection television of claim 1 wherein said  
2 holographic reflector (20) has panchromatic optical properties.

1        6. The projection television of claim 1 wherein said  
2 holographic reflector (20) has optical properties of a concave  
3 mirror.

1        7. The projection television of claim 1 wherein said  
2 holographic reflector (20) has optical properties of a spherical lens  
3 system.

1        8. The projection television of claim 1 wherein said  
2 holographic reflector (20) has optical properties of a parabolic lens  
3 system.

1        9. The projection television of claim 1 wherein:  
2        said screen (22) has a color shift less than or equal to  
3 approximately 2 for all said angles of incidence in a first subrange  
4 of angles of incidence greater than 0° and less than or equal to  
5 approximately 10°; and,  
6        the color shift of said screen (22) is less than or equal to  
7 approximately 5 for all said angles of incidence in a second

8 subrange of angles of incidence greater than approximately  $10^\circ$   
9 and less than or equal to approximately  $30^\circ$ .

1 10. The projection television of claim 1 in which said three-  
2 dimensional hologram (26) has the following performance  
3 specifications:

4 Horizontal half viewing angle:  $38^\circ \pm 3^\circ$

5 Vertical half viewing angle:  $10^\circ \pm 1^\circ$

6 Screen gain:  $\geq 8$

7 Color shift:  $\leq 3$ .

1 11. A projection television comprising:  
2 an optical system comprising at least three image projectors  
3 (14, 16, 18) for projecting respective images of different colors  
4 onto a projection screen (22), and a holographic reflector (20)  
5 disposed in optical communication with said image projector and  
6 said screen so that one (16) of said projectors has a first optical  
7 path in a substantially orthogonal orientation with said screen and  
8 at least two (14, 18) of said projectors having respective optical  
9 paths converging toward said first optical path in a non orthogonal  
10 orientation defining angles of incidence, said holographic reflector  
11 comprising preselected wavelength dependent light reflecting  
12 characteristics suitable for preconditioning said images so as to  
13 compensate for chromatic aberrations induced in said images by  
14 said projection screen (22); and  
15 said projection screen (22) formed by a three dimensional

16 hologram (26) representing a three dimensional array of lenticular  
17 elements disposed on a substrate (24), said screen receiving  
18 images from said projectors (14, 16, 18) on a first side and  
19 displaying said images on a second side with controlled light  
20 dispersion of all said displayed images.

1 12. The projection television of claim 11 wherein said at  
2 least three projectors (14, 16, 18) each include a lens (15, 17, 19)  
3 adapted to focus said respective images.

1 13. The projection television of claim 12 wherein said lenses  
2 (15, 17, 19) comprise a polymer material.

1 14. The projection television of claim 11 wherein said image  
2 projectors (14, 16, 18) comprise exit pupils at least substantially  
3 lacking magnification and focusing properties

1 15. The projection television of claim 11 wherein said  
2 holographic reflector (20) has panchromatic optical properties.

1 16. The projection television of claim 11 wherein said  
2 holographic reflector (20) has optical properties of a concave  
3 mirror.

1 17. The projection television of claim 11 wherein said  
2 holographic reflector (20) has optical properties of a spherical lens

3 system.

1 18. The projection television of claim 11 wherein said  
2 holographic reflector (20) has optical properties of a parabolic lens  
3 system.

1 19. The projection television of claim 11 wherein:  
2 said screen (22) has a color shift less than or equal to  
3 approximately 2 for all said angles of incidence in a first subrange  
4 of angles of incidence greater than  $0^\circ$  and less than or equal to  
5 approximately  $10^\circ$ ; and,

6 the color shift of said screen (22) is less than or equal to  
7 approximately 5 for all said angles of incidence in a second  
8 subrange of angles of incidence greater than approximately  $10^\circ$   
9 and less than or equal to approximately  $30^\circ$ .

1 20. The projection television of claim 11 in which said  
2 three-dimensional hologram (26) has the following performance  
3 specifications:

4 Horizontal half viewing angle:  $38^\circ \pm 3^\circ$

5 Vertical half viewing angle:  $10^\circ \pm 1^\circ$

6 Screen gain:  $\geq 8$

7 Color shift:  $\leq 3$ .